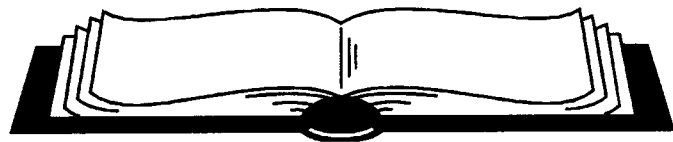


NEW JERSEY

2000-2001

Guidelines and
Application

BEST

PRACTICES

**Deadline for Application to County Office:
NOVEMBER 27, 2000**

The Best Practices application is a public document. The information that you provide will serve as the official record. Review the application prior to submission to ensure accuracy and adherence to the guidelines. Type or keyboard information requested on this page and page 2, if applicable.

Category	Science	(Application is limited to one category. See page 3 for details.)
Practice Name	Authentic Science Research Program (ASRP)	
Number of Schools with Practice	1	(If more than one school or district, read and complete information on page 2.)

County	Bergen		
District (Proper Name)	Emerson Public Schools		
Address	Main St. Street/P. O. Box Emerson, NJ		07630
	City		Zip Code
Telephone	201-262-2828	Fax	201-599-4160 Email
Chief School Administrator	Charles V. Montesano, Ed.D		
Nominated School #1 (Proper Name)	Emerson Junior-Senior High School		
Address	Main St. Street/P. O. Box Emerson, NJ		07630
	City		Zip Code
Telephone	201-262-4447	Fax	201-262-1041 Email
Principal	Earl T. Kim		
Program Developer(s)	Deochand Deodharrie and Dr. Robert Paulica		
Application Prepared By	Deochand Deodharrie		
Chief School Administrator's or Charter School Lead Person's Signature	<i>Charles V. Montesano</i>		

FOR USE BY COUNTY SUPERINTENDENT OF SCHOOLS ONLY	
Approved: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	County Superintendent's Signature <i>Jaron R. Graham</i>

**NEW JERSEY
BEST PRACTICES
2000-2001 APPLICATION**

Application Requirements: Failure to comply with the procedures for submission of the application will result in the elimination of the application.

1. **RESPONSES to the information and the statements below must be ANONYMOUS and ACCURATE.** No reference should be made to the names of the district, the school(s) or community. Use the words "the school" or "the schools" in referring to the applicant in responding to the statements
2. **USE ONLY THE SPACE PROVIDED ON THE APPLICATION FORM on pages 1, 2 (if applicable), and 4.** Do not include any additional materials, as they will not be reviewed in the selection process.
3. Application must be keyboarded on 8 1/2" x 11" white paper, portrait format. Twelve-point or larger computer font or fourteen-pitch or larger typewritten font must be used. (This sentence is in twelve-point Times New Roman.)
4. **KEYBOARDED RESPONSES** to all the statements below must be **no more than a total of four pages.** Keyboard and number the statement followed by the response. Format your response for accuracy and clarity.
5. The information on page 4 and the responses to statements must be copied on one side of the page. The information on pages 1 and 2 (if applicable) must be copied on one side of the page. Staple pages 1, 2 (if applicable), 4, and the keyboarded responses together, in that same order.
6. The original application must be signed by the district chief school administrator or charter school lead person, indicating his/her approval.
7. The original and seven copies of the application must be submitted to the county superintendent of schools by **November 27, 2000**, with the **Itemized List of District Applications** form. Keep the seven copies of each application together with the original containing the signature of the district chief school administrator or charter school lead person on the top of each set.

The following data is required to assist the panelists in the evaluation of the application:		
Type of School <input type="checkbox"/> Elementary School <input type="checkbox"/> Middle School <input type="checkbox"/> Junior High School <input checked="" type="checkbox"/> High School <input type="checkbox"/> Other: _____	Grade Levels _____ _____ 9-12 _____	Practice Name <u>Authentic Science Research Program (ASRP)</u> Number of Schools with Practice <u>1</u> Number of Districts with Practice <u>1</u> Location <input type="checkbox"/> Urban/City <input type="checkbox"/> Suburban With Urban Characteristics <input checked="" type="checkbox"/> Suburban <input type="checkbox"/> Small City/Town <input type="checkbox"/> Rural

Check the ONE CATEGORY into which the practice best fits.		
<input type="checkbox"/> Arts (Visual and Performing Arts) <input type="checkbox"/> Assessment/Evaluation <input type="checkbox"/> Bilingual Education and Diversity <input type="checkbox"/> Citizenship/Character Education <input type="checkbox"/> Early Childhood Education Programs <input type="checkbox"/> Educational Support/Guidance and Counseling Programs	<input type="checkbox"/> Educational Technology <input type="checkbox"/> Gifted and Talented Programs <input type="checkbox"/> Health and Physical Education <input type="checkbox"/> Language Arts Literacy <input type="checkbox"/> Mathematics <input type="checkbox"/> Professional Development <input type="checkbox"/> Public Engagement (family involvement and partnerships with business, community, school districts, and/or higher education)	<input type="checkbox"/> Safe Learning Environment <input type="checkbox"/> School-to-Careers/Workplace Readiness <input checked="" type="checkbox"/> Science <input type="checkbox"/> Social Studies <input type="checkbox"/> Special Education <input type="checkbox"/> World Languages

1. Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative and how it promotes high student achievement.
2. List the specific *Core Curriculum Content Standards*, including the *Cross-Content Workplace Readiness Standards*,* addressed by the practice and describe how the practice addresses those standard(s). Provide an example to substantiate your response.
3. Describe the educational needs of students that the practice addresses. Document the assessment measures used to determine the extent to which the objectives of the practice have been met. Provide assessments and data to show how the practice met these needs.
4. Describe how you would replicate the practice in another school and/or district.

*The 1996 edition of the *Core Curriculum Content Standards* published by the New Jersey State Department of Education was disseminated to all districts and charter schools and is available on line through the department's web site at <http://www.state.nj.us/education>.
6appbp.20

1. Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative and how it promotes high student achievement.

The *Authentic Science Research Program* is a three-year (Grades 10-12) collaborative endeavor between the high school, local research facilities, and a local four-year college. The program culminates with a publishable piece of original research for each student. Students' work may be published in venues ranging from the school's website to professional journals. Students' work may also be submitted for prizes in local science competitions and the national Intel-Westinghouse Science Competition. Each student is guided by both an in-school teacher-mentor and an out-of-school scientist-mentor. Laboratory research is carried out in the scientist-mentor's laboratory. Through an agreement between a local college and the high school, each student will gain between 12 to 18 undergraduate credits from a local college.

The science research course is designed to provide students with an understanding of research methodology in the natural and social sciences. The course is directed to those students who wish to pursue excellence and progress into advanced areas of original research. Emphasis is on both laboratory and bibliographic research. Students are taught the process of on-line bibliographic researching and are able to access the scientific databases in DIALOG, EBSCO and other electronic and print repositories.

Among the many objectives of this unique program are :

- To provide students with an opportunity to explore topics of interest in any natural/social sciences, for an extended period of time.
- To apply the scientific method to problem solving.
- To interact with practicing scientists in industry and academia.
- To develop a publishable piece of research.
- To encourage students to pursue careers in the sciences.
- To foster the integration of various disciplines, such as math, social studies, geography, psychology, history, science, etc.

This practice is innovative in that this school is the only high school in New Jersey to offer a three-year science research program worth 12-18 college credits that involves so many practicing scientist-mentors on an on-going basis. This program promotes high student achievement by giving students the opportunity: to focus on one science problem for three years; to work with cutting edge technology; to be supervised by scientists; to publish their work; and to enter local, state, and national science competitions.

2. List the specific *Core Curriculum Content Standards, including the Cross-Content Workplace Readiness Standards*, addressed by the practice and describe how the practice addresses those standard(s). Provide an example to substantiate your response.

- *Science Standard #2 All students will develop problem solving, decision making, and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.* In ASRP all students must follow the scientific method for their three-year research project: identifying a topic of interest, conducting a review of literature on that topic, finding a local mentor, developing a research question and hypothesis in conjunction with the mentor, design an experiment

that answers their specific question, analyzing the results of their experiment and publishing/presenting their findings and conclusions.

- ***Science Standard #4 All students will develop an understanding of technology as an application of scientific principles.*** Students will work with various equipment found in research laboratories. The equipment used will vary with nature of student projects. For example, a student working on gene transcription will use gel electrophoresis in order to analyze results of transcription.
- ***Science Standard #5 All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.*** Data collection and analysis are integral to this program. For example, in conducting “natural experiments,” students will use descriptive statistics to compare effect on treatment vs. control group.
- ***Science Standard #6 All students will learn to identify systems of interacting components and understand how their interactions combine to produce the overall behavior of the system.*** Each student will be involved in the experimental design and modification processes, and will recognize that the behavior of a system may be different from the behavior of its components. In our example of gene transcription, the student will be required to know the specific interactions between enzymes and DNA in order to execute the correct transcription. Prior to this effort, the student will have to have hypothesized the connection between specific genes and behaviors or characteristics.
- ***Science Standard #7 All students will investigate the diversity of life.*** All students will be able to explain how DNA can be altered by recombinant gene splicing to create transgenic organisms. Through regular research group presentations, students will share their work with other students. As DNA-based research is one of the common areas of interest this year, all students will gain an understanding of the basis for diversity—genetic coding.
- ***Science Standard # 12 All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.*** Students will use economic, scientific, and other empirical data to assess environmental risks and benefits associated with human activity.
- ***Cross-Content Workplace Readiness Standards***
 1. All students will develop career planning and workplace readiness skills.
 2. All students will use information, technology, and other tools.
 3. All students will use critical thinking, decision making, and problem solving skills.
 4. All students will demonstrate self-management skills.
 5. All students will apply safety principles.

Student X is studying the transfer of an alkaloid-producing gene to a species of bacteria, thus creating transgenic organisms that are de facto biofactories. This student is studying the impact and benefits associated with this change. Also, this student will be able to explain how DNA can be altered. All workplace readiness standards apply since the student will be working in a research lab environment.

3. **Describe the educational needs of students that the practice addresses. Document the assessment measures used to determine the extent to which the objectives of the practice have been met. Provide assessments and data to show how the practice met these needs.**

Needs :

- Practicing science by attempting to solve open-ended problems with practical applications with real-life situations. This course takes each student beyond the regular cook-book experiments, which tends to be bereft of wonder and excitement.
- To encourage the use of initiative and creativity, and to become better problem solvers.
- To be a part of the scientific research community.

Assessment measures:

- biweekly evaluation of progress as referenced to a mutually developed contract of tasks to be achieved
- biweekly evaluation of a multimedia in-class presentation on research topic
- biweekly check of 18-section portfolio
- biweekly calls to scientist mentors to check on progress
- biweekly 30-minute one-on-one conference
- biweekly one-on-one analysis of pertinent scientific article
- participation in Annual Science Research Symposium at school
- attendance at scientific seminars/conferences
- participating in science competitions
- e-mails to/from scientists
- evidence of awards/grants/honors/recognition

At each biweekly meeting, Forms 2(Goal Sheet), 7(Biweekly Assessment), and 14(Record of Independent Research Time) are completed, and signed by teacher and student. Data are available to show that students' needs have been met, even though this is an on-going process.

4. Describe how you would replicate the practice in another school and/or district.

- Assess the needs of students/science faculty/community-at-large/administration
- Develop the program/become aware of the program
- Seek cooperation of Science supervisor/Administrator/BOE
- Meet and discuss research program with other science research teachers
- Advertise the program among students. Invite applications from students
- Seek mentors from colleges/industries
- Make course proposal for college credits from a neighboring college
- Arrange for BOE to sign agreement with college for granting credits
- Continuous reassessment of program must be done
- Network with scientists-join scientific organizations